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1991

ENERGY AND MONTANA

AN OVERVIEW

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PREPARED FOR THE
ENVIRONMENTAL QUALITY COUNCIL

by the
Montana Department of Natural Resources and Conservation
Energy Division
November 1, 1991



GLOSSARY

Average MW: Abbreviation for average Megawatt. A unit of energy output over a specified time period, equivalent to the total energy in MWh divided by 8,760 (the number of hours in a year).

Barrel: 42 U.S. gallons.

bcf: Abbreviation for billion cubic feet. See mcf.

Btu: Abbreviation for British Thermal Unit. A measure of heat content being the quantity of heat necessary to raise the temperature of 1 pound of water 1 degree Fahrenheit (elevate 59°F to 60°F, at 1 atmosphere pressure).

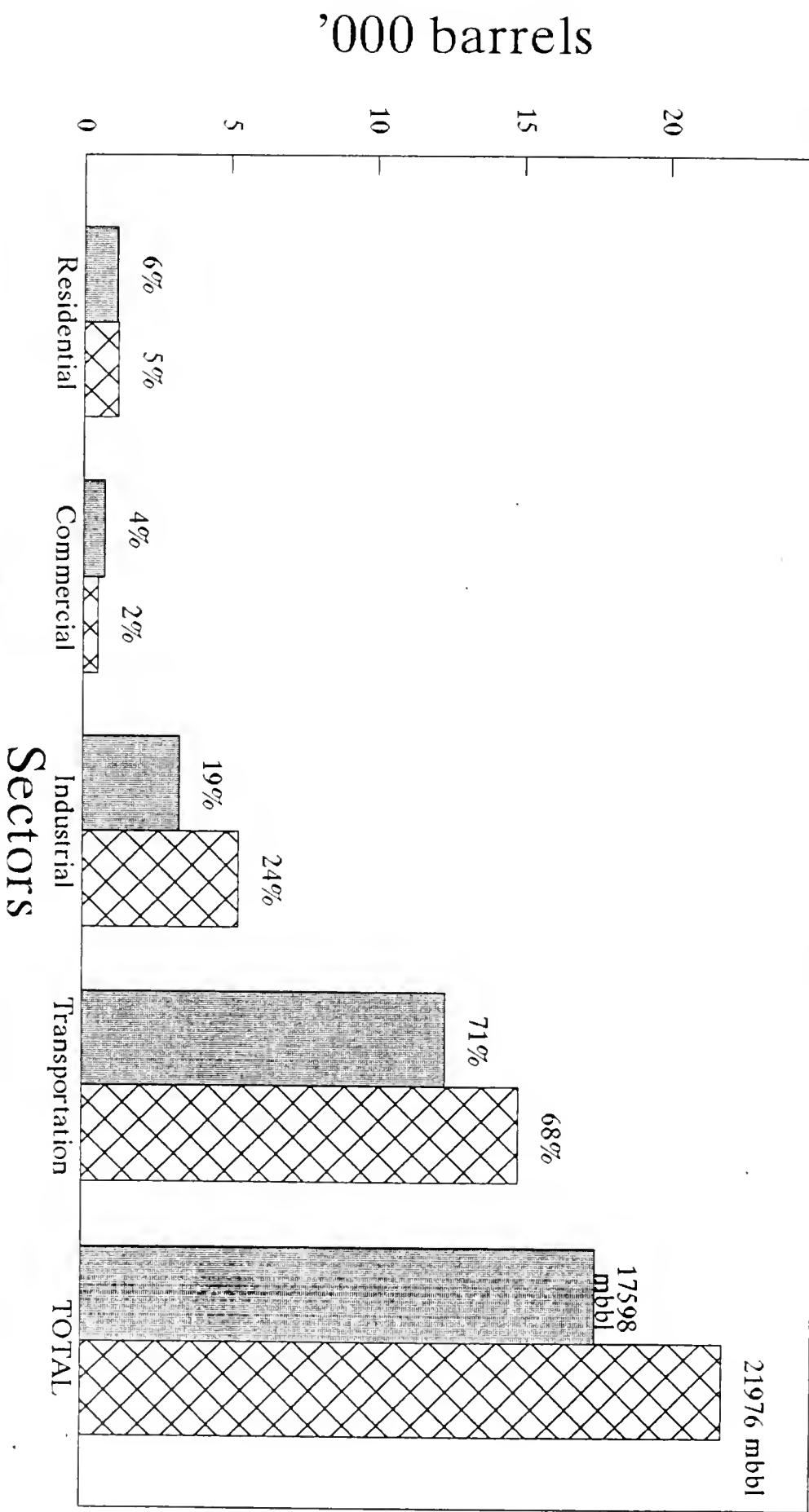
kWh: Abbreviation for kilowatt-hour. A watt is an electrical unit of power or rate of doing work, where 746 watts equals about 1 horsepower. A kilowatt-hour is one thousand watts supplied/consumed steadily for one hour. A kWh contains approximately 3,412 Btus.

mcf: Abbreviation for thousand cubic feet. A measure of gas volume. Burning 1 mcf of natural gas at 1 atmosphere pressure releases roughly 1 million Btus of heat.

MWh: Abbreviation for megawatt-hour, one million watt-hours. See kWh.

PETROLEUM USE

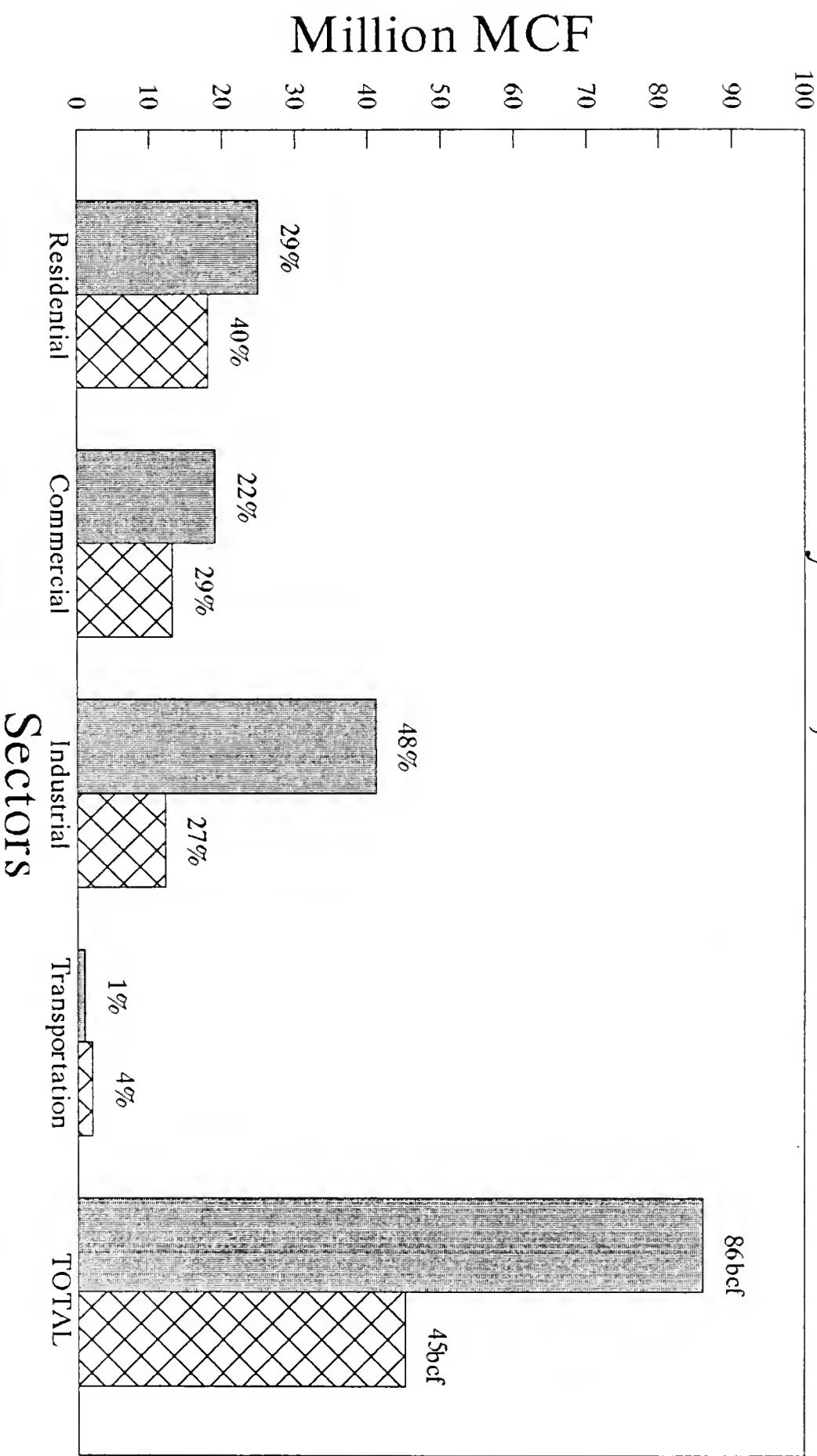
By sector, 1970 and 1989



NOTE: Industrial sector consumption does not include refinery use or asphalt; does include farm and off-highway use.
The percentage of annual consumption is above each sector bar.

NATURAL GAS USE

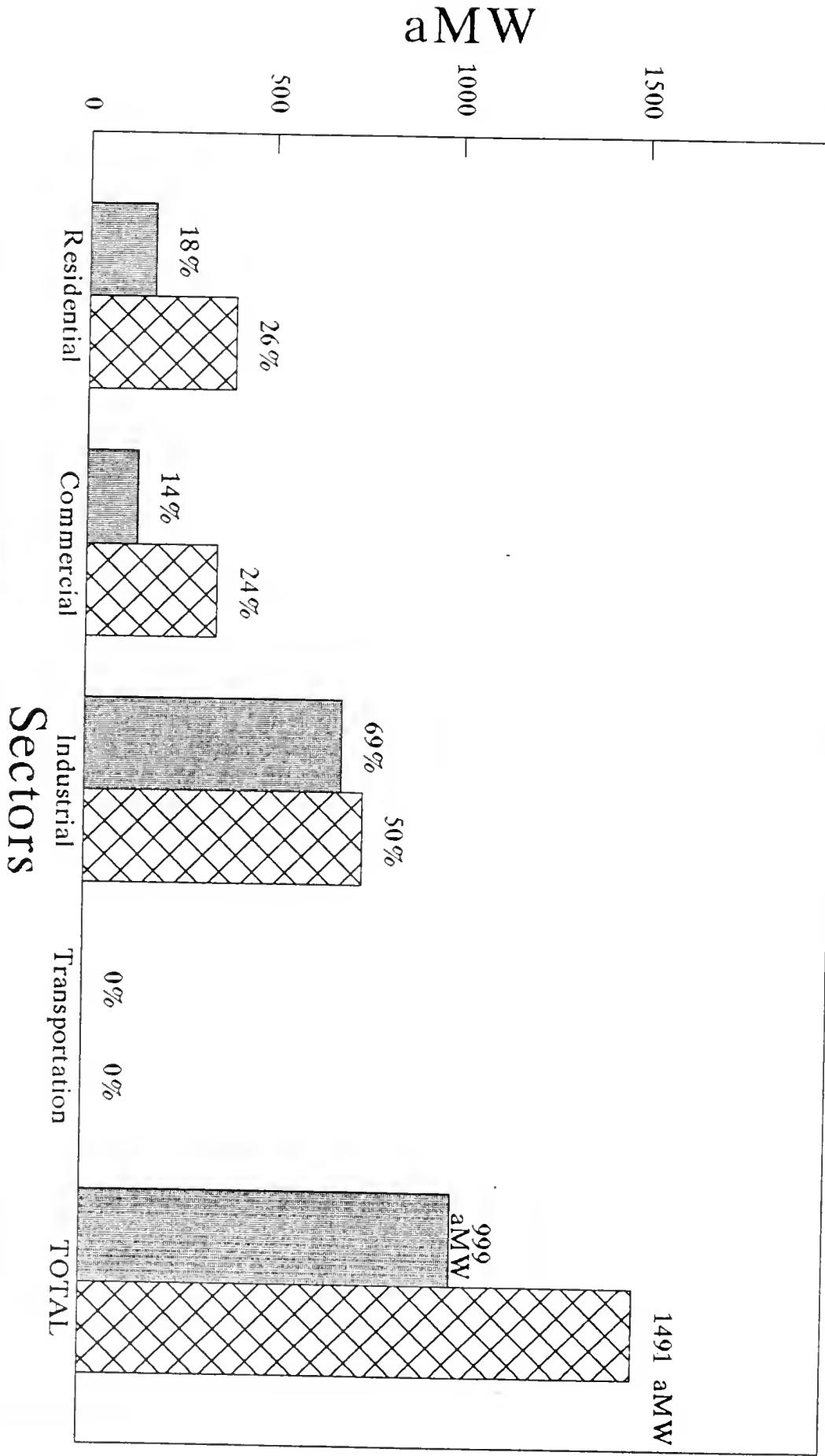
By sector, 1970 and 1989



The percentage of annual consumption is shown above each sector.

ELECTRICITY USE

By sector, 1970 and 1989



■ 1970 ☒ 1989

The percentage of annual consumption is above each sector bar.

Montana's Rank Among Producing States

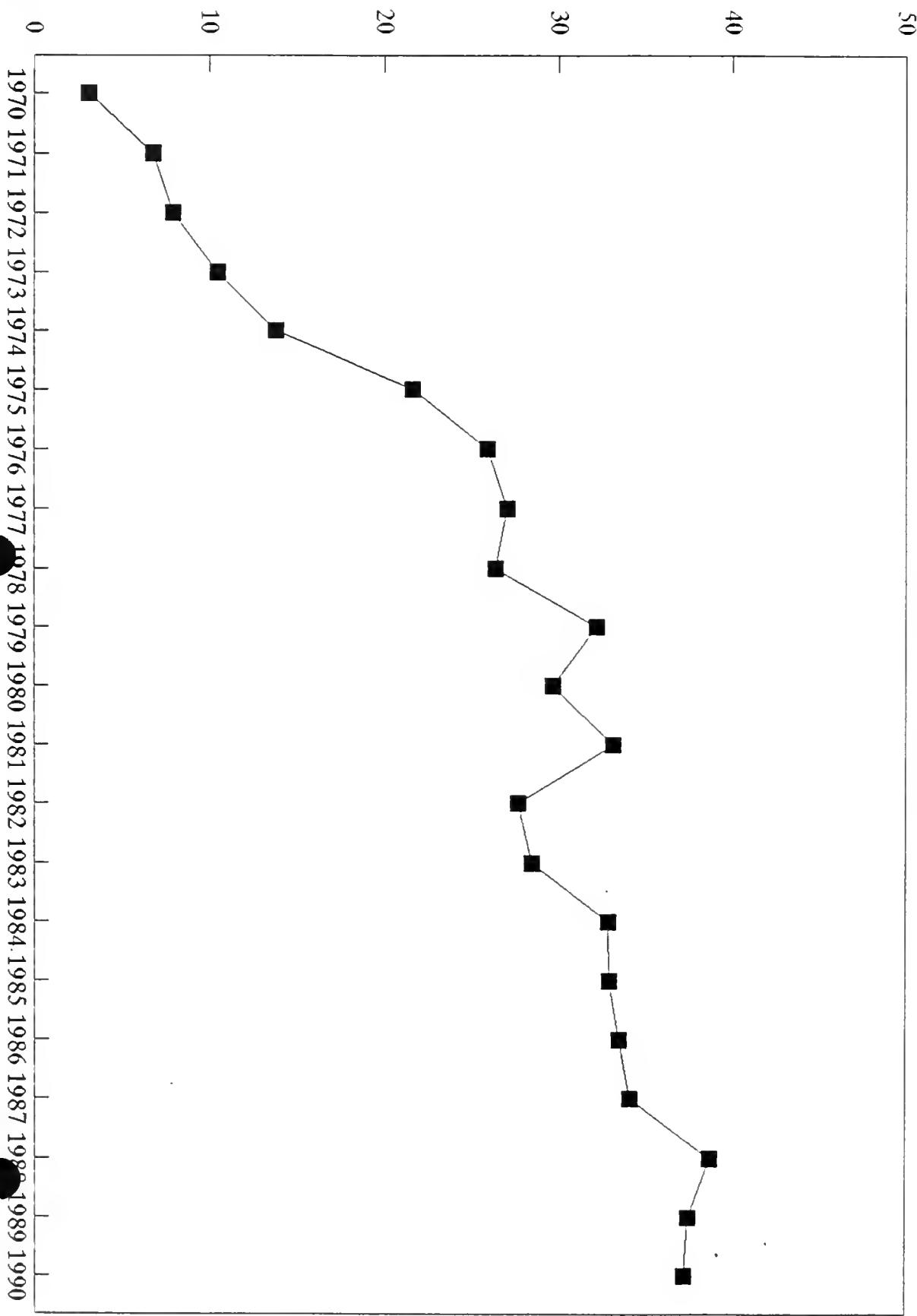
	1980	1990
Coal	9	8
Crude oil	14	14
Natural gas	16	18
Electricity	39	38

SUBBITUMINOUS COAL

1970 - 1990

Tons

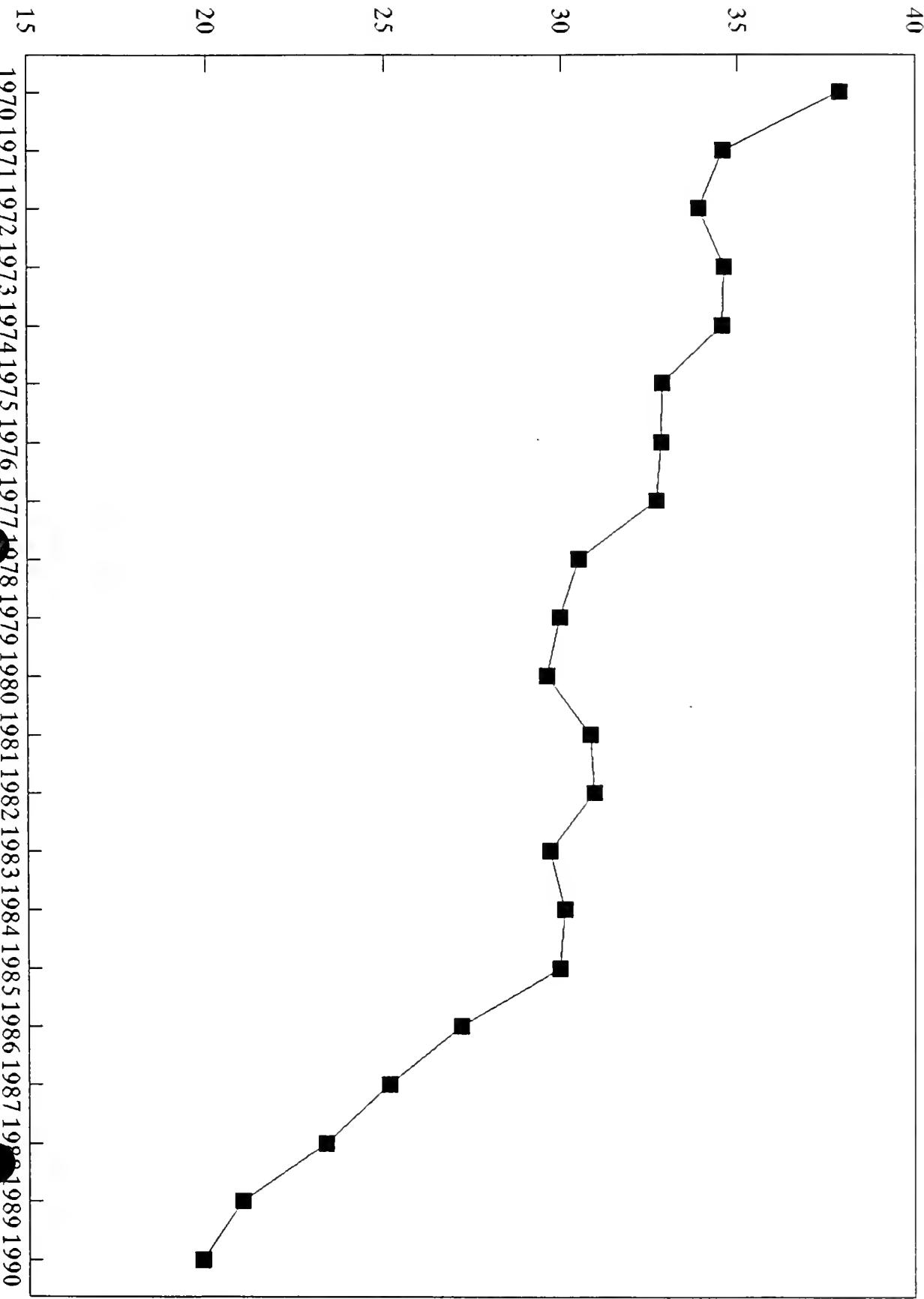
Millions

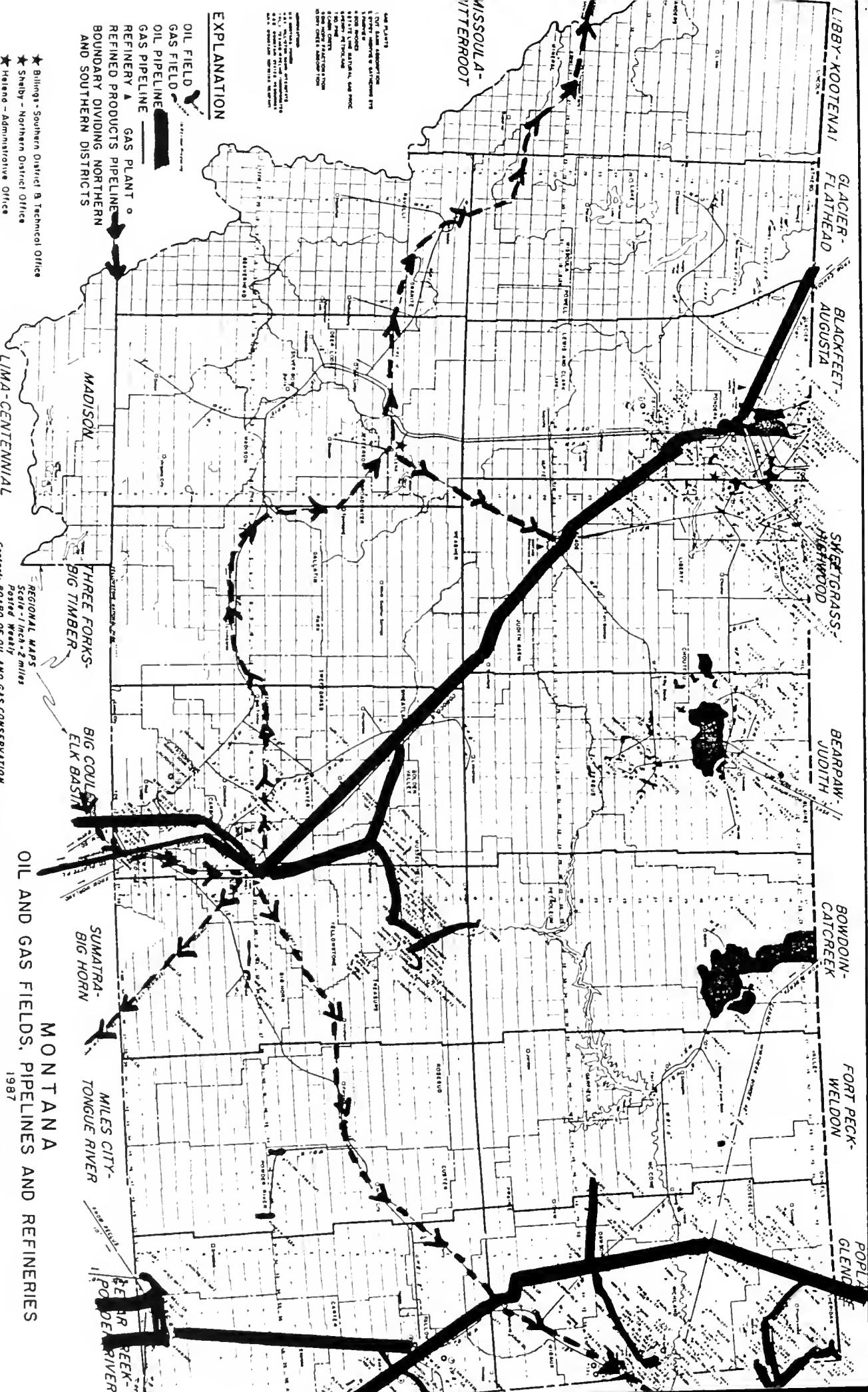


OIL PRODUCTION 1970–1990

Barrels

Millions

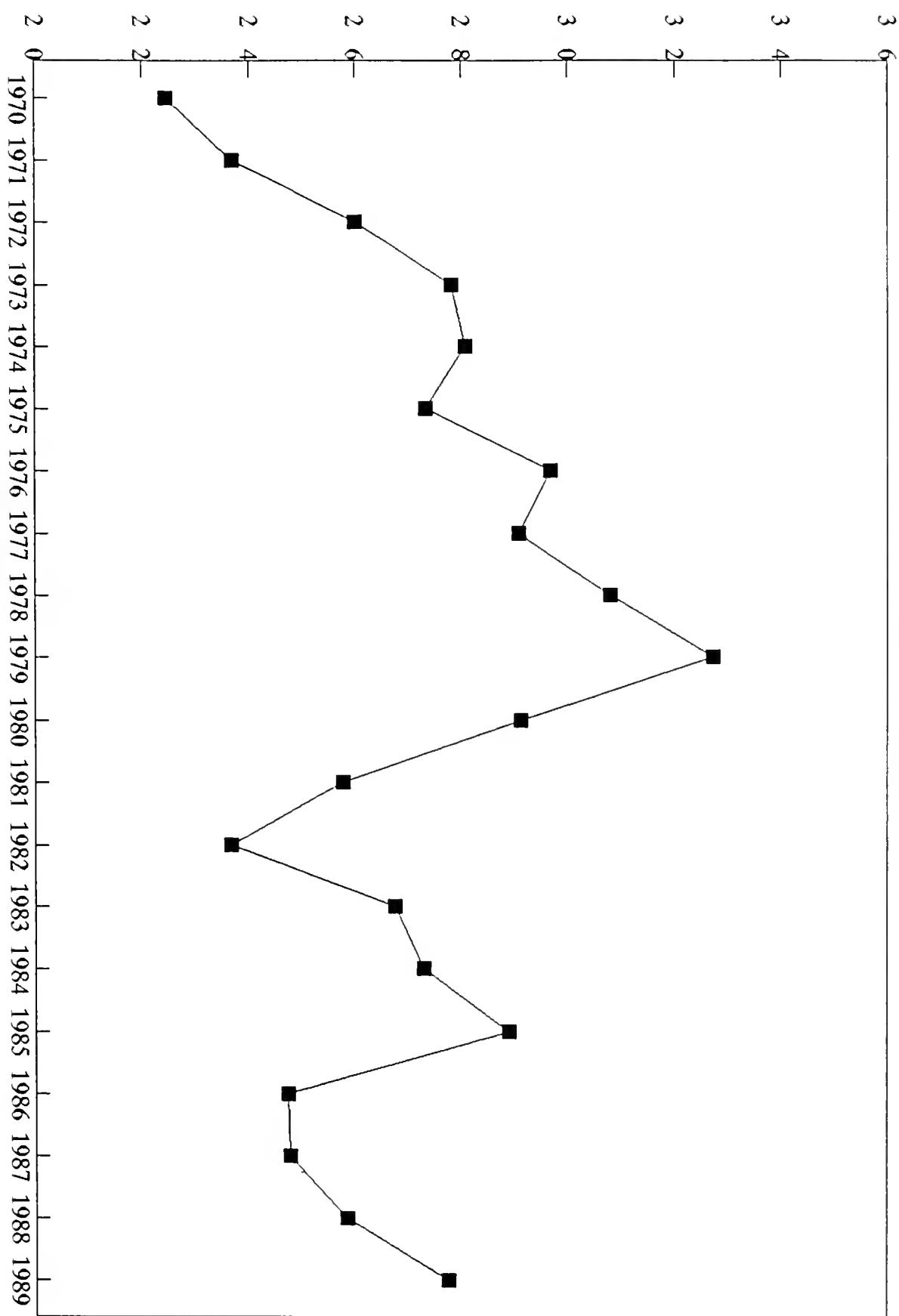




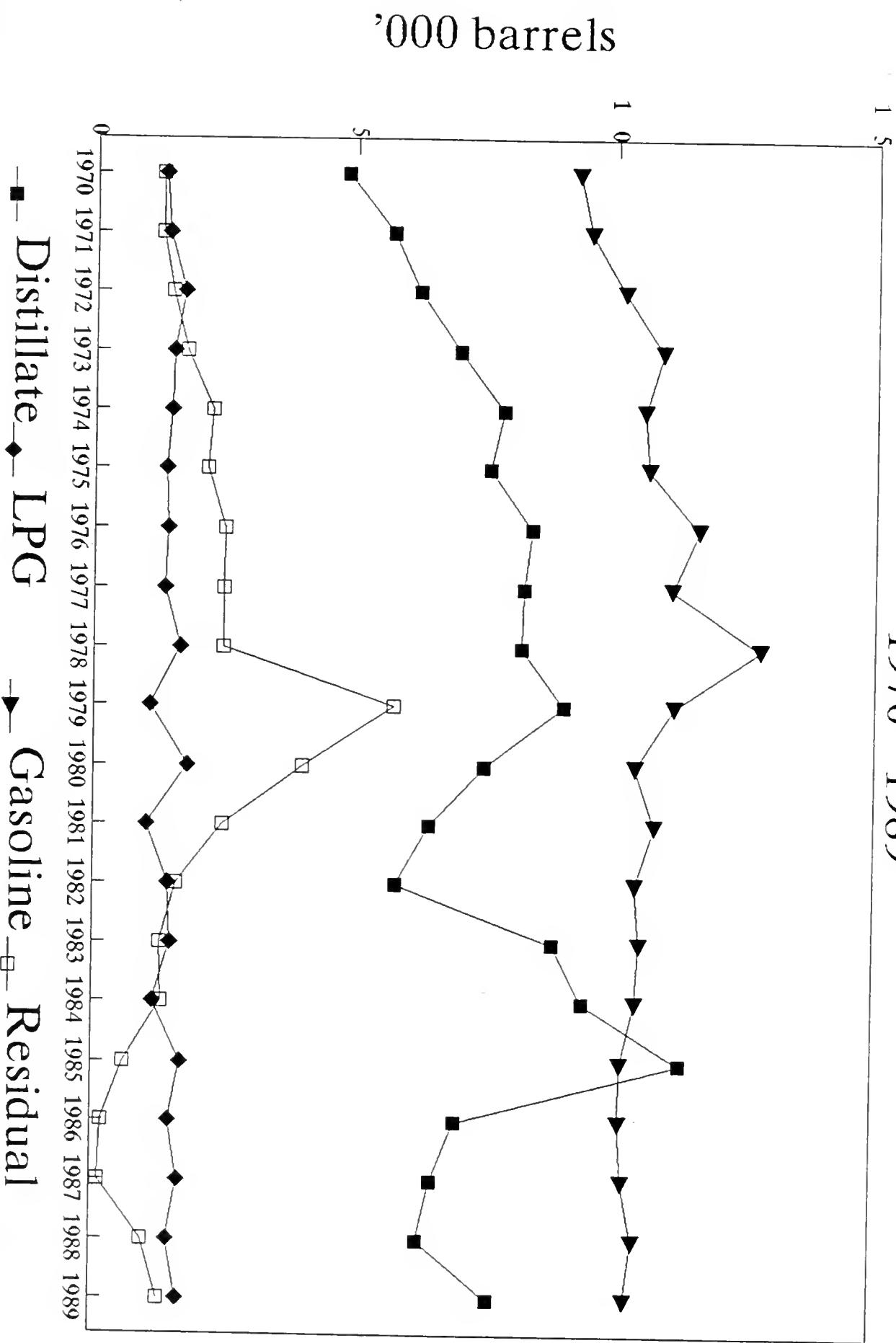
OIL CONSUMPTION

1970–1989

Million barrels

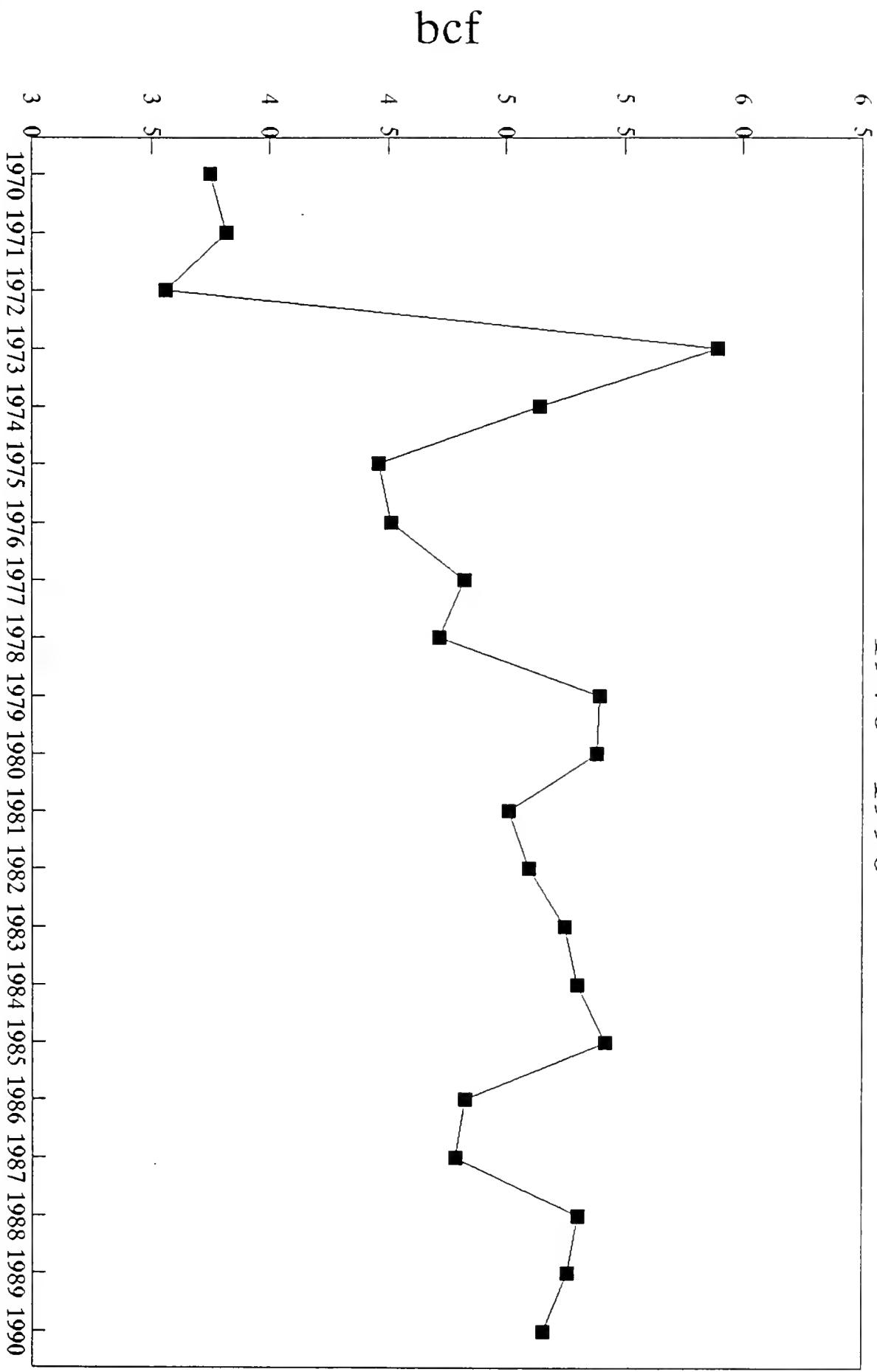


PETROLEUM PRODUCT CONSUMPTION 1970–1989



GAS PRODUCTION

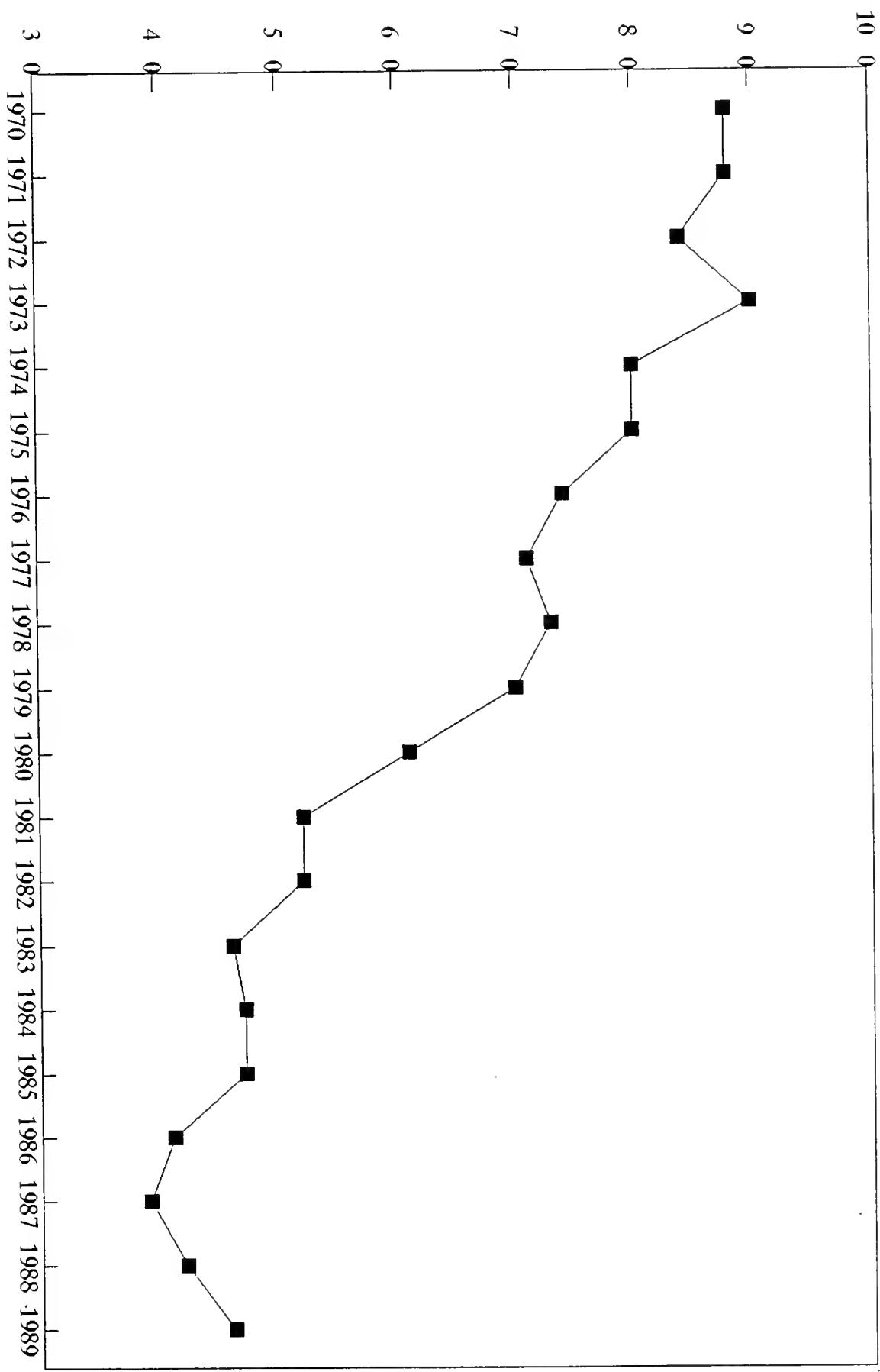
1970–1990



GAS CONSUMPTION

1970 - 1989

bcf



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TABLE 2.1
ELECTRIC POWER PLANTS BY PRIMARY FUEL, 1989

HYDROELECTRIC PLANTS

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY		
				Capacity ¹ (megawatts)	Critical Water Year (average MW)	Median Water Year (average MW)
Champion International Corp.	Lake Creek	Lincoln	1916	5.0	2.3	2.8
Montana Department of Natural Resources and Conservation	Broadwater	Broadwater	1989	10.0	6.2	7.1
Montana Power Company	Black Eagle	Cascade	1927	18.0	14.0	18.0
Montana Power Company	Cochrane	Cascade	1958	50.0	22.0	34.0
Montana Power Company	Flint Creek	Granite	1901	1.1	1.0	1.0
Montana Power Company	Hauser Lake	Lewis & Clark	1907	16.5	12.0	16.0
Montana Power Company	Holter	Lewis & Clark	1918	49.0	24.0	30.0
Montana Power Company	Kerr	Lake	1938	180.0	119.0	128.0
Montana Power Company	Milltown	Missoula	1906	3.4	2.0	2.0
Montana Power Company	Morony	Cascade	1930	47.0	25.0	36.0
Montana Power Company	Mystic Lake	Stillwater	1925	11.5	6.0	6.0
Montana Power Company	Rainbow	Cascade	1910	35.0	29.0	35.0
Montana Power Company	Ryan	Cascade	1915	60.0	41.0	56.0
Montana Power Company	Thompson Falls	Sanders	1915	40.0	35.0	34.0
Montana Power Company	Madison	Madison	1906	8.5	7.0	8.0
Pacific Power & Light Co.	Bigfork	Flathead	1910	4.0	3.0	3.5
U.S. Dept. of the Army, North Pacific Division						
Corps of Engineers	Libby	Lincoln	1975	525.0	180.0	220.0
U.S. Dept. of the Army, Missouri River Division,						
Corps of Engineers	Fort Peck	McCone	1943	185.0	83.0	119.0
Mission Valley Power Co.	Hell Roaring	Lake	1915	0.4	NA	NA
U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region	Canyon Ferry	Lewis & Clark	1953	50.0	30.4	45.9
U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region	Yellowtail	Big Horn	1966	250.0	60.3	103.9
U.S. Dept. of the Interior, Bureau of Reclamation, Pacific Northwest Region	Hungry Horse	Flathead	1952	285.0	96.0	108.0
Washington Water Power Co.	Noxon Rapids	Sanders	1959	467.0	152.0	215.0
TOTAL HYDROELECTRIC CAPABILITY				2,301.4 megawatts		

TABLE 2.1 (continued)

FOSSIL FUEL FIRED PLANTS

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY			Fuel
				Capacity ¹ (megawatts)	Average (average MW)		
Montana-Dakota Utilities	Glendive	Dawson	1979	34.8			natural gas; #2 fuel oil
Montana-Dakota Utilities	Lewis & Clark	Richland	1958	50.9			lignite
Montana-Dakota Utilities	Miles City	Custer	1972	24.2			natural gas; #2 fuel oil
Montana Power Company	Frank Bird	Yellowstone	1951	60.0	3.0		oil; natural gas
Montana Power Company	J.E. Corette	Yellowstone	1968	156.0	125.0		subbituminous coal
Montana Power Company and Puget Sound Power & Light	Colstrip I	Rosebud	1975	314.0	245.0		subbituminous coal
Montana Power Company, Puget Sound Power & Light	Colstrip II	Rosebud	1976	320.0	246.0		subbituminous coal
Montana Power Company Puget Sound Power & Light, Portland General Electric, Washington Water Power, and Pacific Power & Light	Colstrip III	Rosebud	1984	720.0	562.0		subbituminous coal
Montana Power Company Puget Sound Power & Light, Portland General Electric, Washington Water Power, and Pacific Power & Light	Colstrip IV	Rosebud	1985	720.0	562.0		subbituminous coal
TOTAL FOSSIL FUEL FIRED CAPABILITY				2,399.9 megawatts			

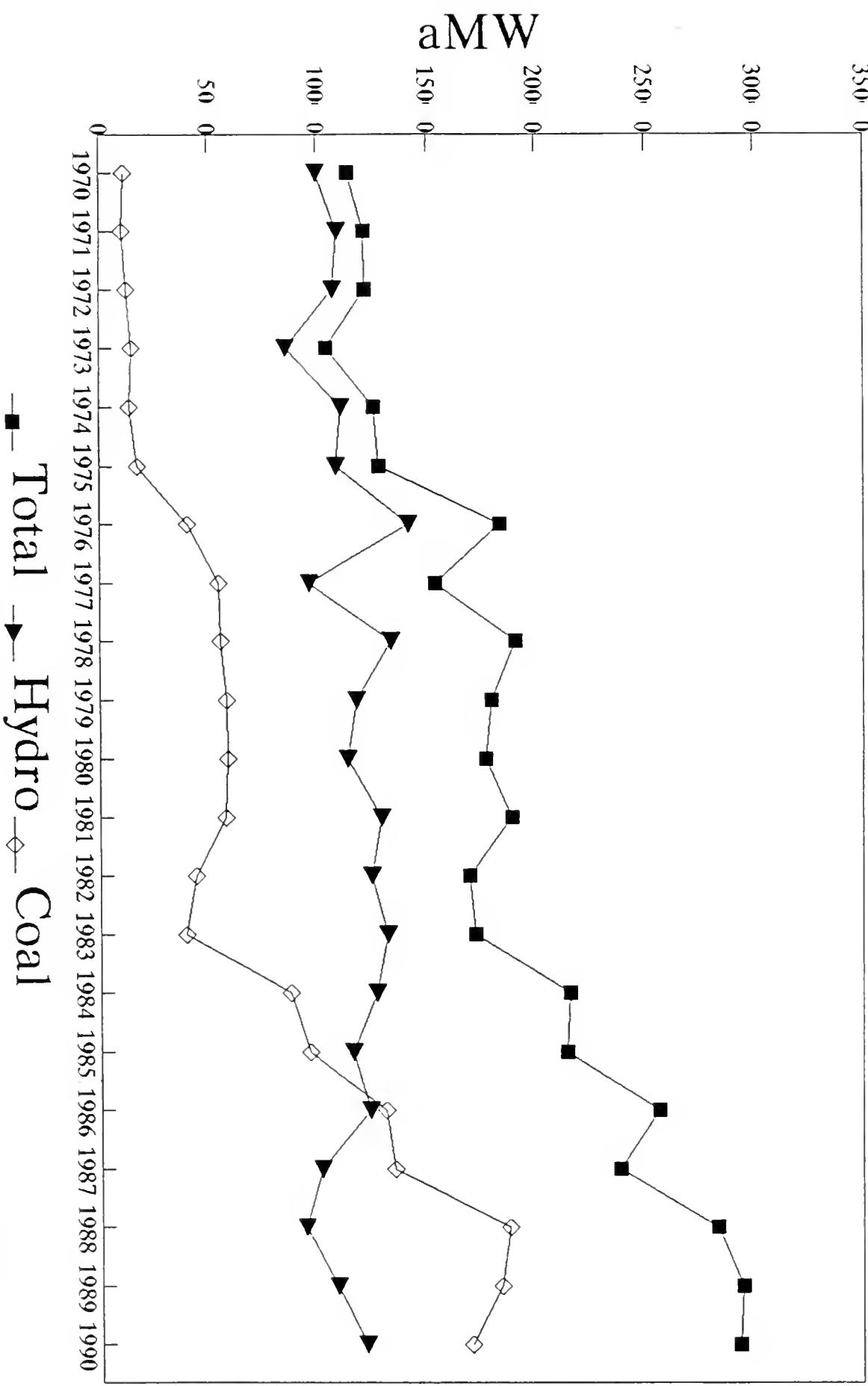
OTHER PLANTS

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY			Fuel
				Capacity ¹ (megawatts)	Average (average MW)		
Champion International Corp.	Libby	Lincoln	1939	12.5	7.6		wood and waste products
TOTAL CAPABILITY OF OTHER PLANTS				12.5			
TOTAL MONTANA GENERATING CAPABILITY				4,713.8 megawatts			

¹ Unless otherwise specified, capacity denotes installed nameplate capacity

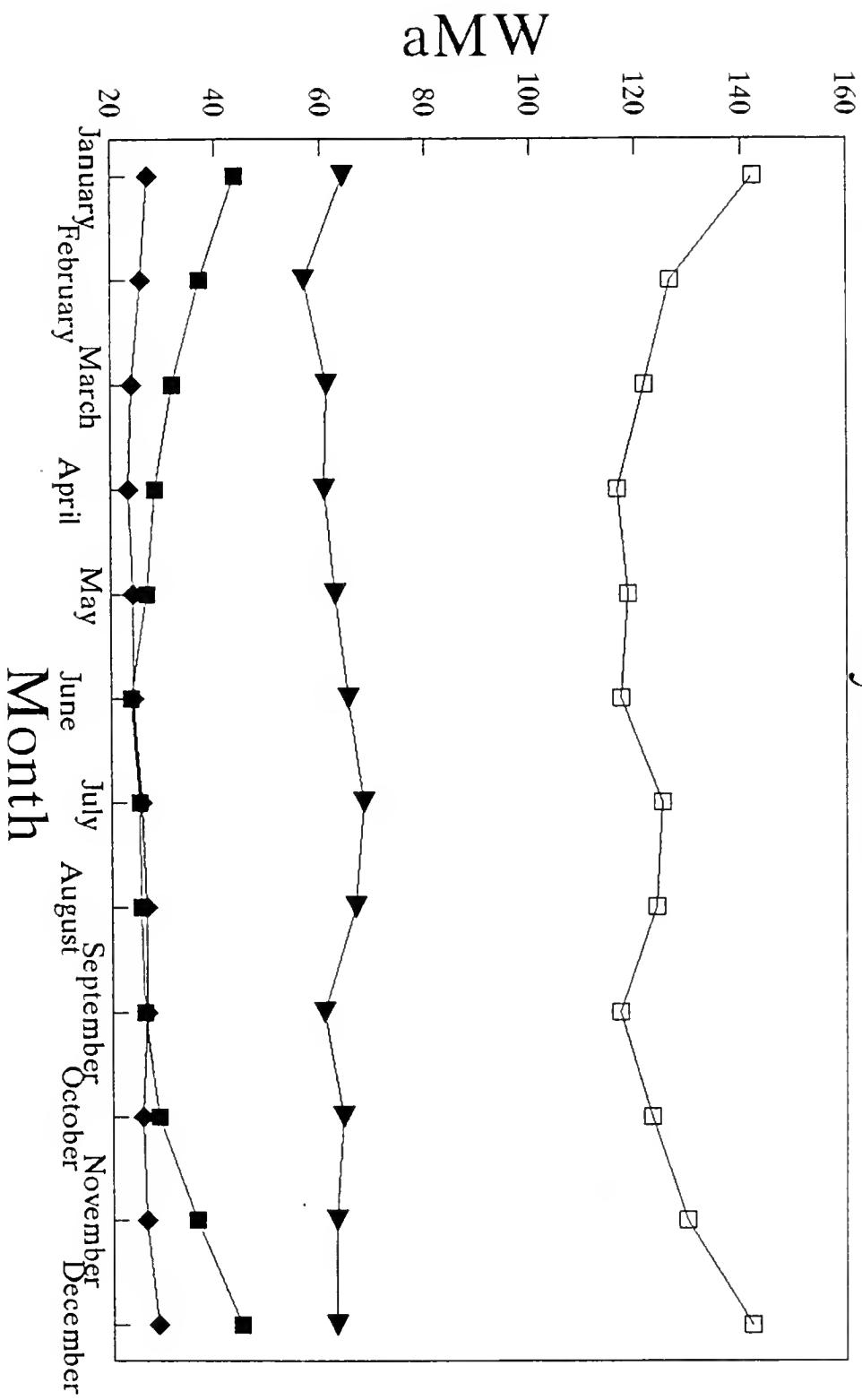
ELECTRIC GENERATION

1970–1990



1990 ELECTRICAL SALE

By sector



- Residential
- ▼ Industrial
- ◆ Commercial
- Total

Based on Table 2.3, Historical Statistics

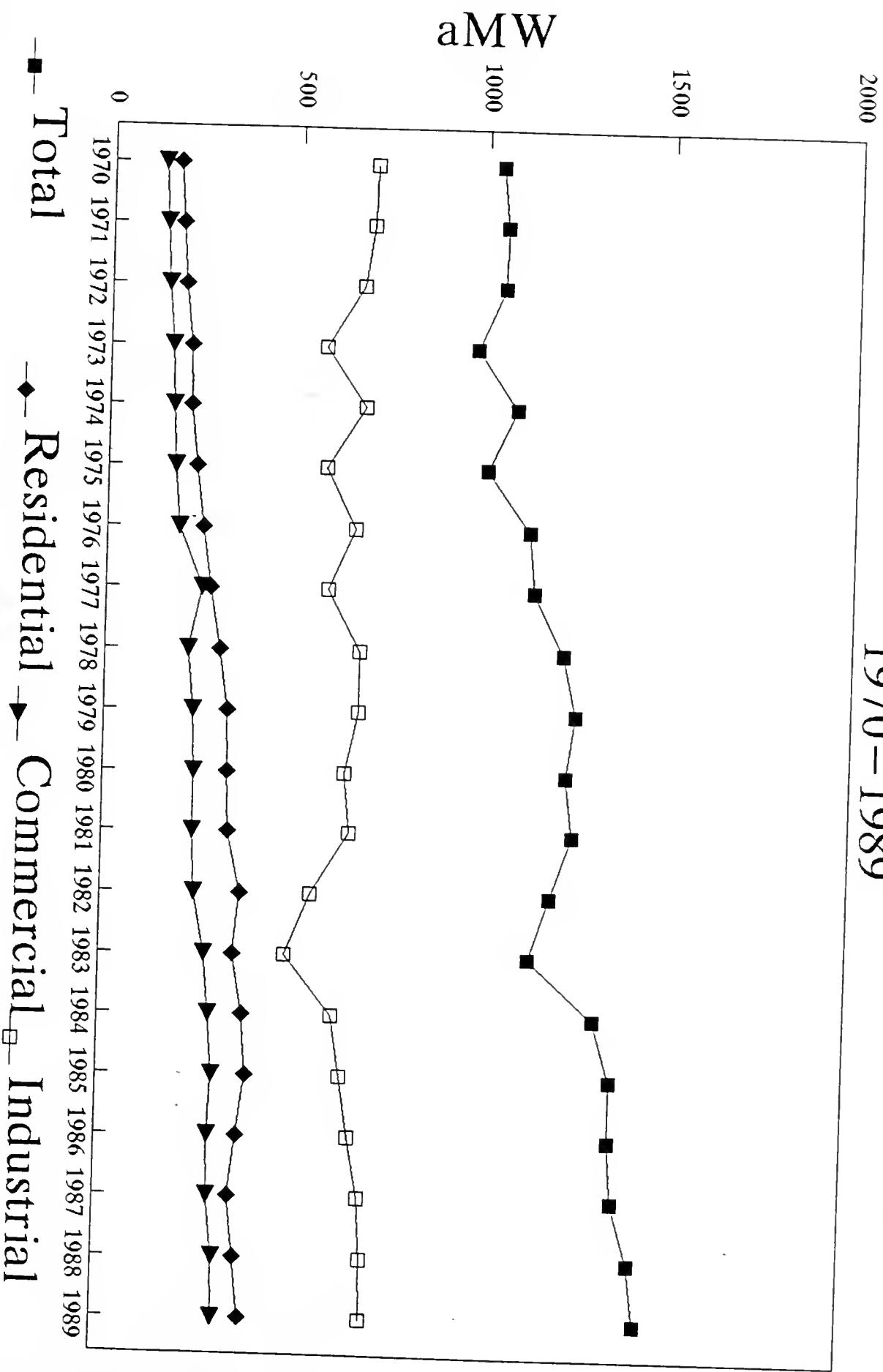
Retail Sales and Residential Customers

	Sales (aMW)	Customers
MPC	826.7	205,000
MDU	55.1	23,000
PP&L	79.5	25,000
BPA DSI	338.0	—
Western coops#	119.2	31,000*
Eastern coops	<u>111.2</u>	<u>34,000*</u>
Total	1530.0	318,000

- * Number of residential customers for coops was estimated.
- # Western coops are those served by BPA. They're located in the western third of the state.

ELECTRICITY SALES

1970–1989



State-wide Sales by Sector, 1990

Residential	378.9 aMW
Commercial	309.0
CFAC	338.0
Other industrial	418.4
Other	<u>59.2</u>
Total Sales	1503.4 aMW

Line losses (est. 10%) 167.0

Total system requirements 1670.5 aMW

Exports (est) 1265.3 aMW

NOTE: Commercial and industrial end-use figures
may be influenced by rate category definitions as well
as by the actual nature of the businesses.

BRITISH COLUMBIA

ALBERTA

EDMONTON AREA DETAIL

WASHINGTON

OREGON

NEVADA

CALIFORNIA

IDAH

MONTANA

WYOMING

UTAH

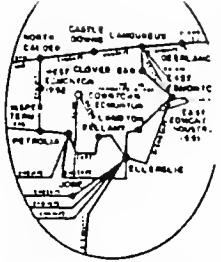
COLORADO

SEE
SACRAMENTO-
DELTA
AREA
DETAIL

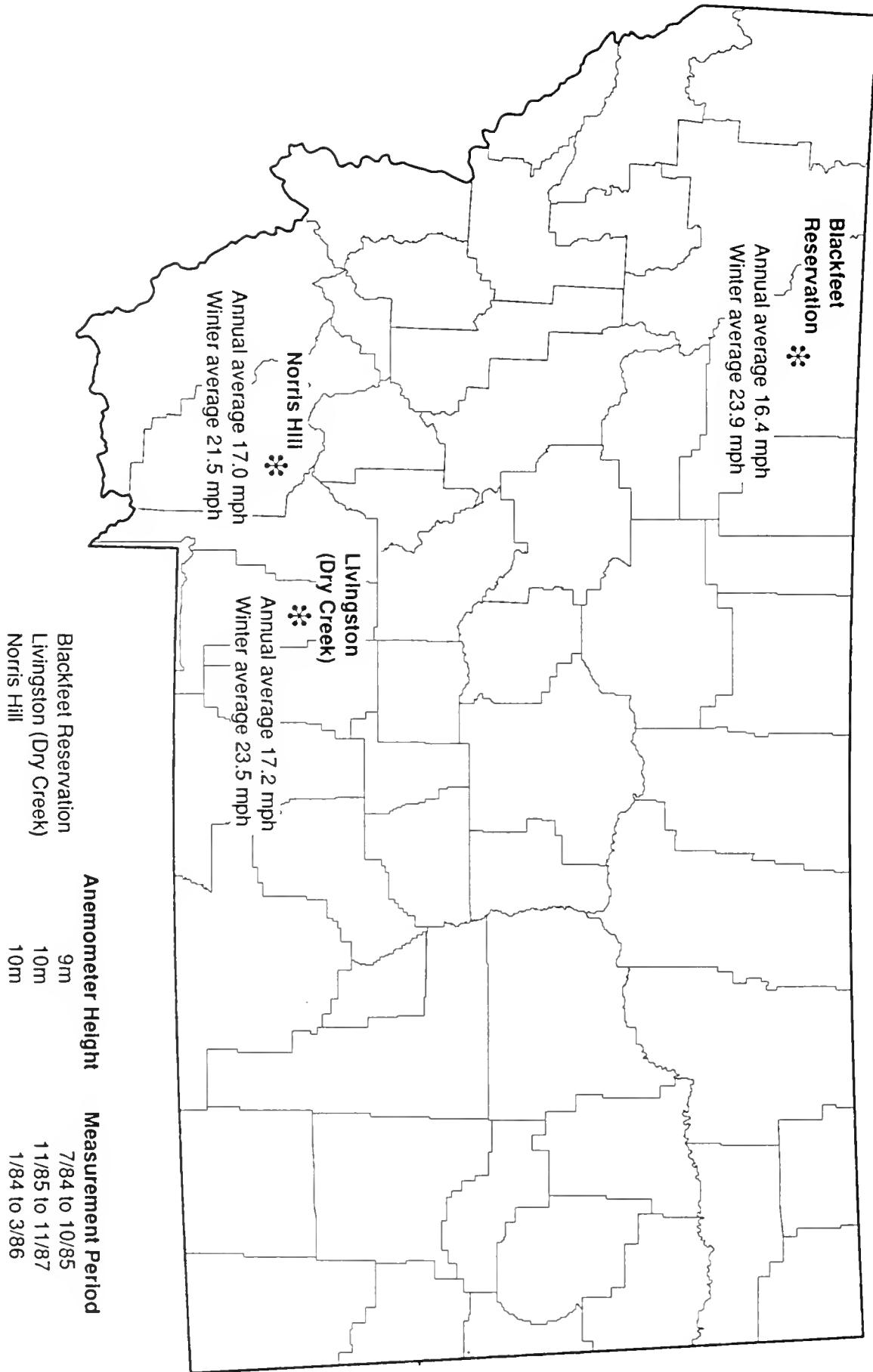
SEE
SACRAMENTO-
NEVADA
AREA
DETAIL

ARIZONA

NEW MEXICO

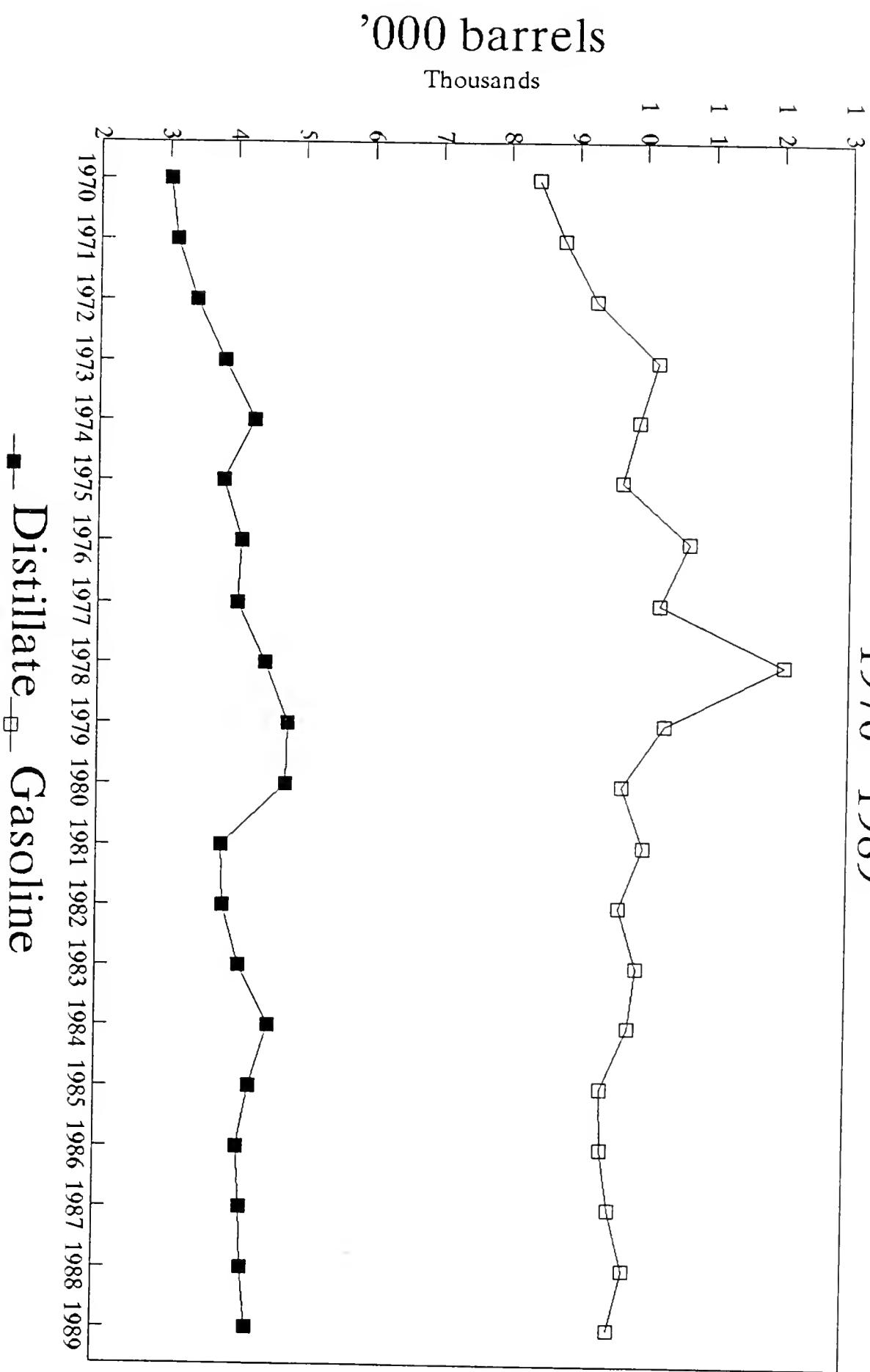


Potential Wind Sites



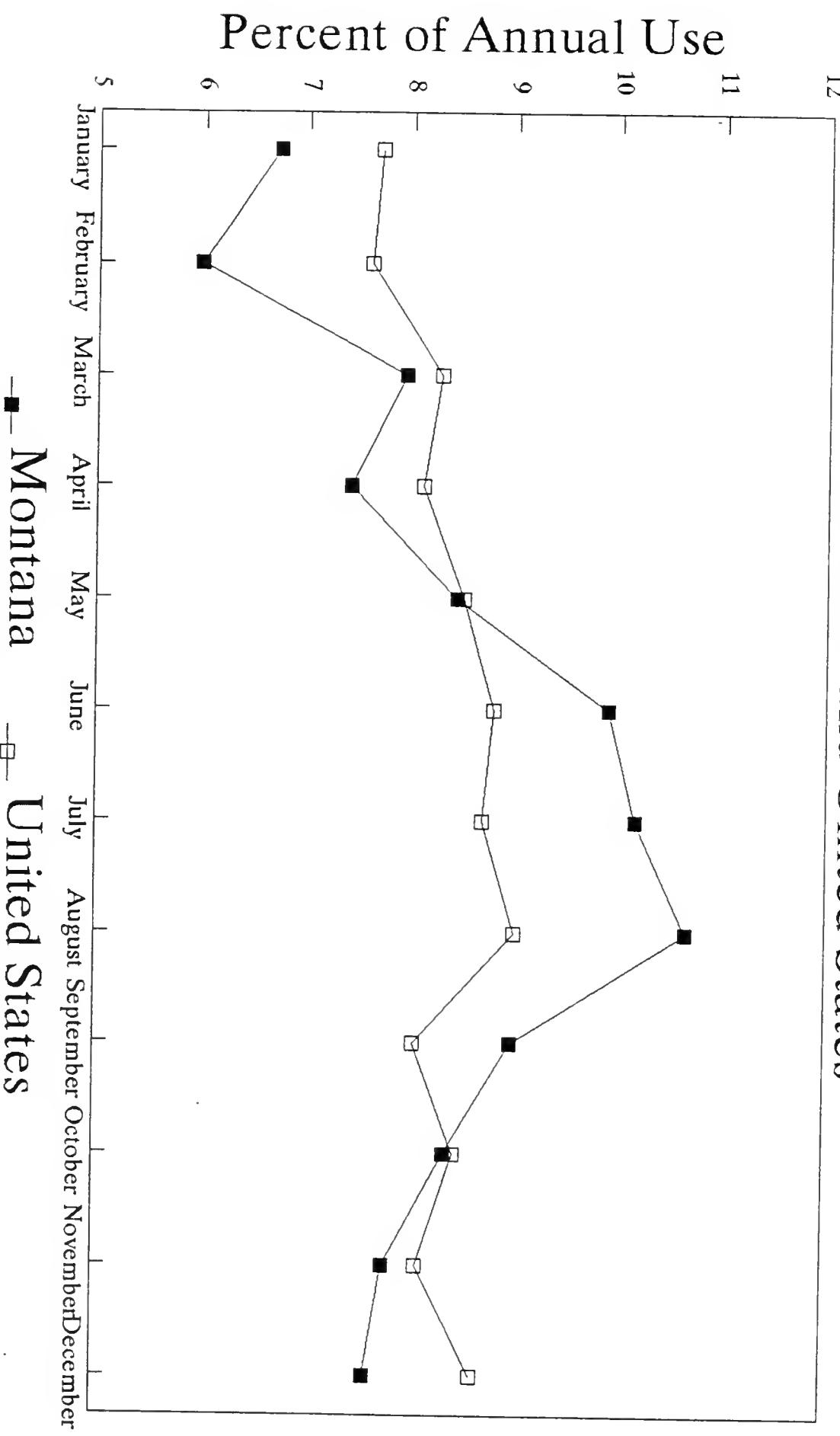
TRANSPORTATION FUEL

1970–1989



GASOLINE USE 1989

Montana and United States



Based on gross gallons of gasoline reported by wholesale distributors.
This may reflect a month or more lag between wholesale and retail sales.

FLEET EFFICIENCY

